



Hemodynamic responses in humans to the perception of compatible and incompatible body motion

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Lateral temporoparietal cortex and motion processing

- Human MT+ & motion perception
 - Zeki *et al.*, 1991; Watson *et al.*, 1993; Tootell *et al.*, 1995
- Human superior temporal sulcus (STS) & human movement perception
 - Bonda *et al.*, 1996; Puce *et al.*, 1998; Beauchamp *et al.*, 2002
- Monkey STPa - majority of cells respond to ‘compatible’ motion
 - Oram & Perrett, 1996

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Stimuli

- Control Motion
- Compatible Motion
 - *head & body moving in same direction as facing*
- Incompatible Motion
 - *head & body moving in opposite direction as facing*



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Methods

- 12 healthy subjects aged 19-50 (6m, 6f)
- 12s blocks x 3 cycles x 2 runs
- Whole brain MRI at 3T (GE MRI scanner)
- Gradient echo EPI
 - TE=40, TR=2s, flip angle=40, FOV=25, 128x128
- 17 axial slices
 - 6mm with 1mm skip

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Analysis

- Analysed using SPM99
 - realigned, slice timing adjusted, normalised, smoothed.
- GLM - 5 regressors of interest
 - control
 - head compatible
 - body compatible
 - head incompatible
 - body incompatible

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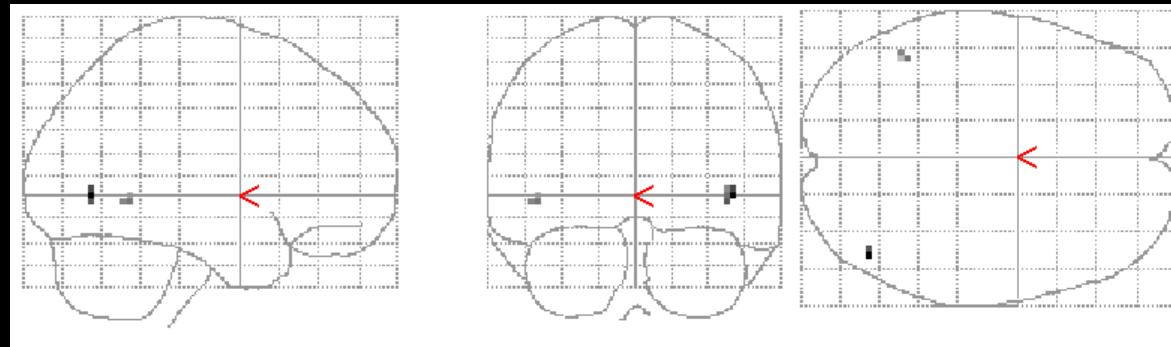
Analysis

- Responses greater than control
- Response to Compatible & Incompatible Motion regardless of stimuli
 - *Conjunction of head & body*
- Stimuli-specific effects of Compatible & Incompatible Motion
 - *Exclusion mask of conjunction*
- Random Effects Analysis, thresholded at $p<0.001$ (uncorr), $K=4$ voxels ($p < 0.05$)

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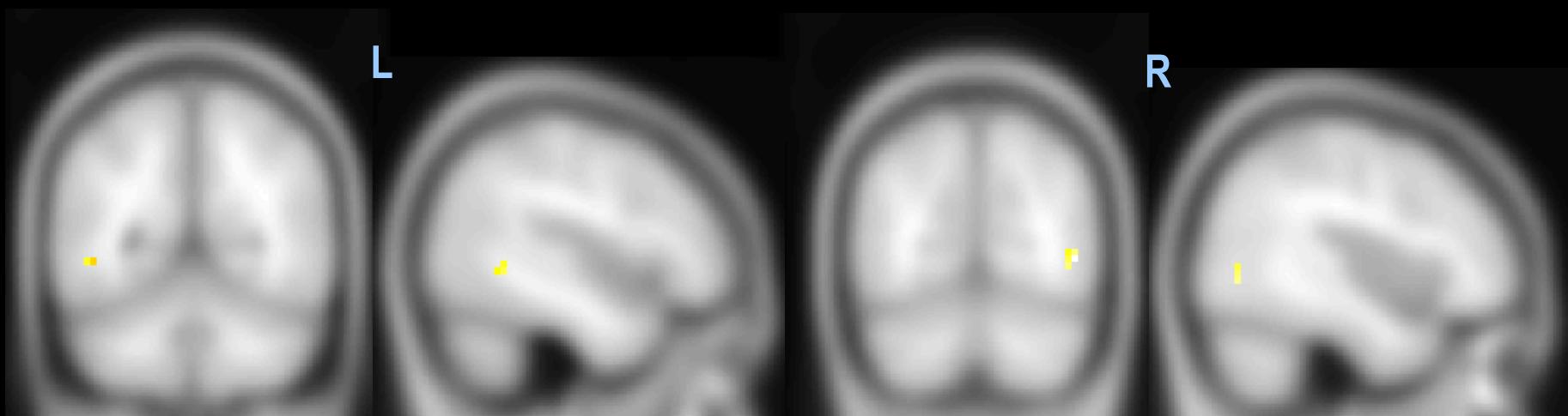
Compatible Motion *head-body conjunction*



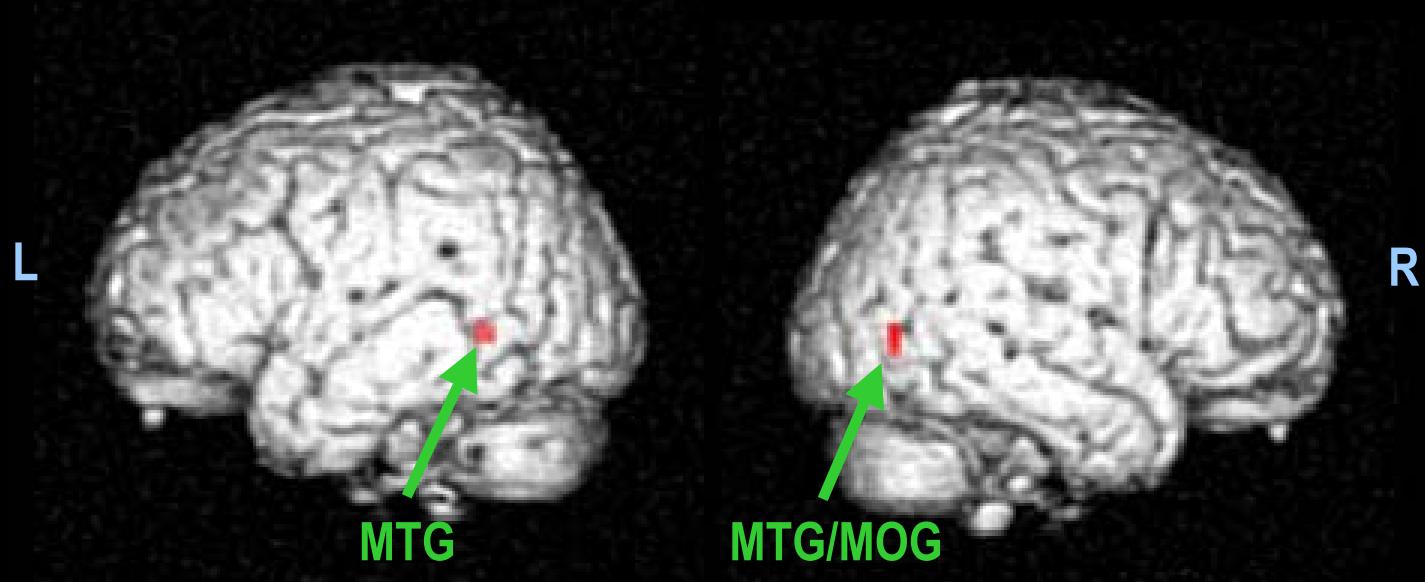
Talairach Co-ordinates

posterior lateral temporal cortex

	x	y	z
R	45	-69	0
L	-45	-51	-3



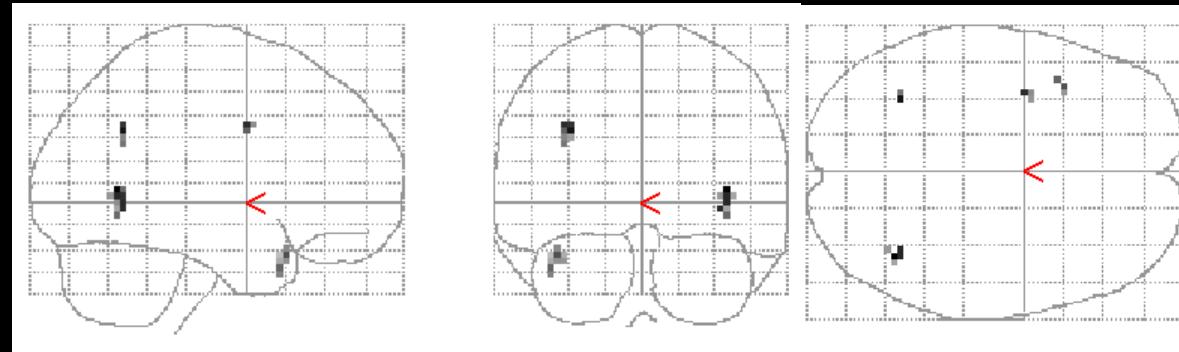
Compatible Motion *head-body conjunction*



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Incompatible Motion *head-body conjunction*



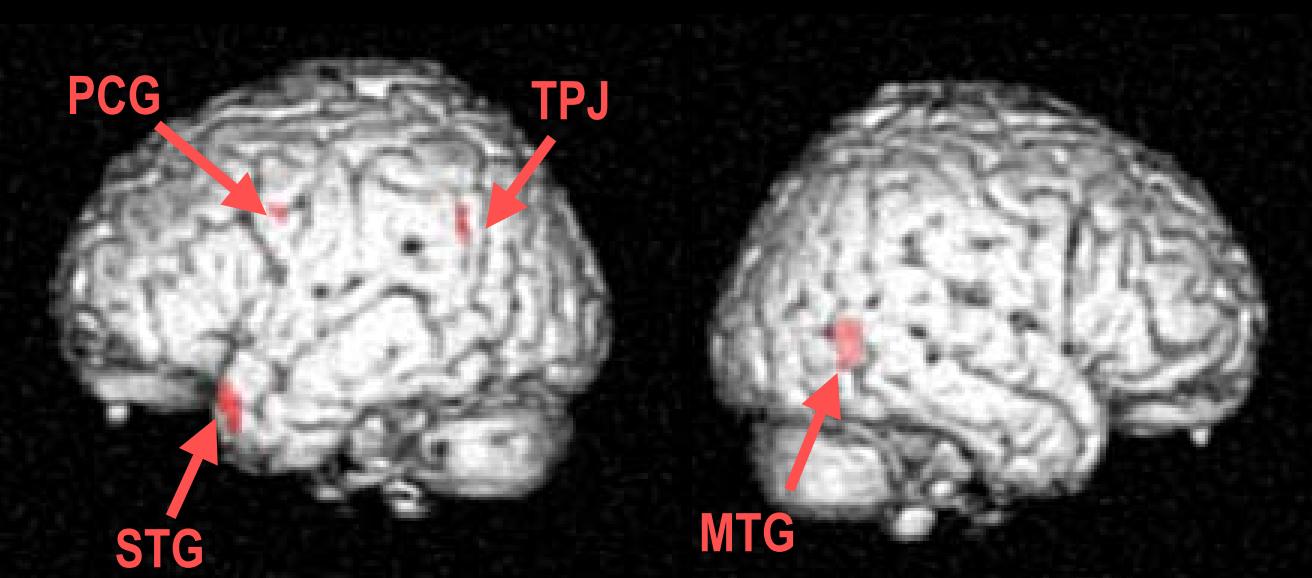
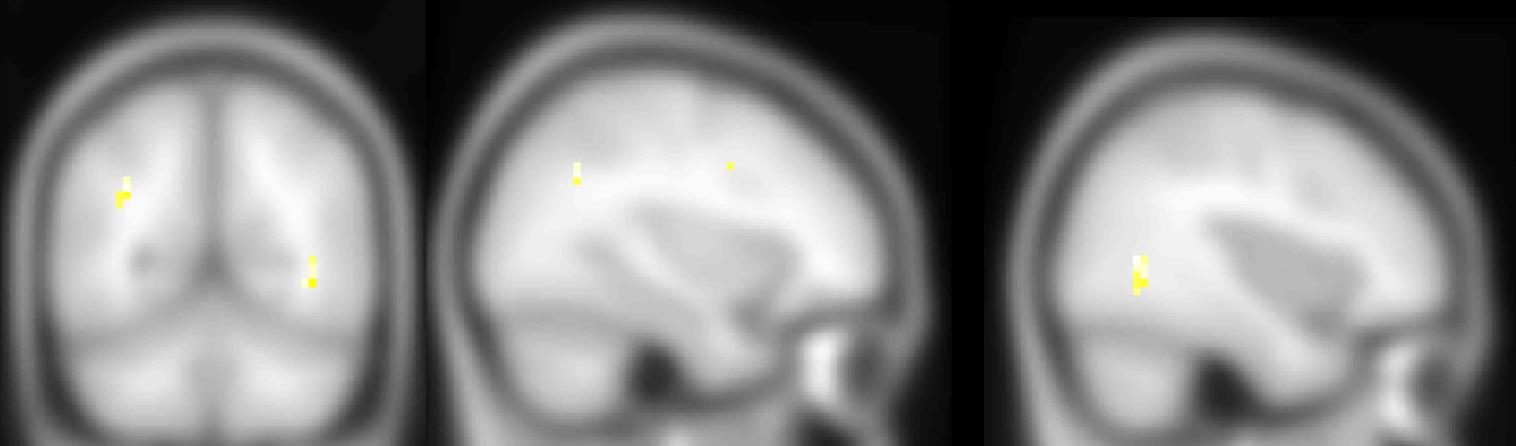
Talairach Co-ordinates

		x	y	z
posterior lateral temporal cortex	R	39	-60	6
anterior lateral temporal cortex	L	-39	18	-24
inferior parietal cortex	L	-33	-57	33
premotor cortex	L	-36	0	39

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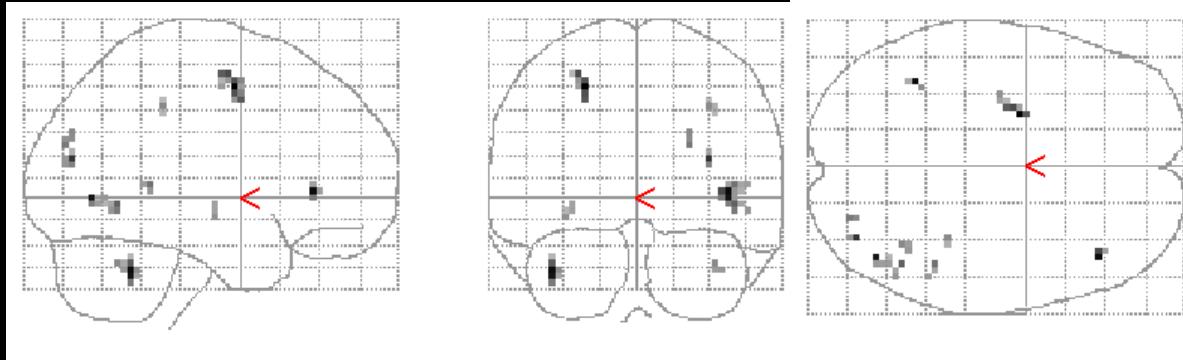
Incompatible Motion *head-body conjunction*



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Incompatible Motion *head only*



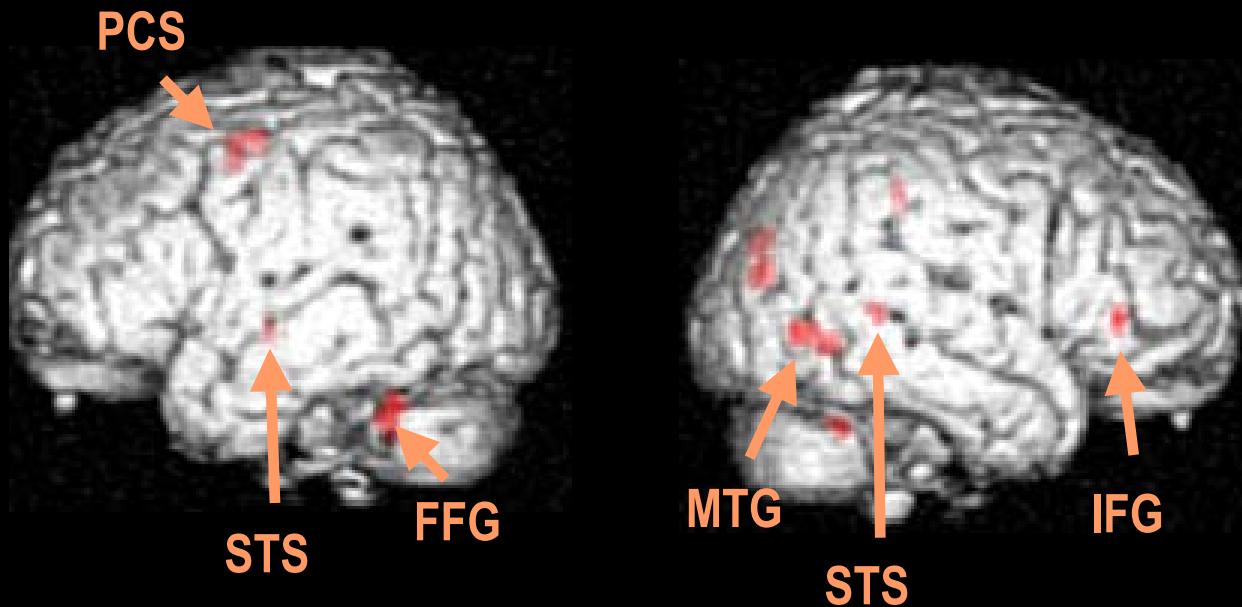
Talairach Co-ordinates

		x	y	z
lateral occipitoparietal cortex	R	33	-78	18
medial occipital cortex	R	24	-81	24
inferior temporal cortex	L	-39	-51	-33
posterior lateral temporal cortex	R	45	-57	-3
	R	45	-42	6
	R	42	-69	0
	L	-33	-12	-9
premotor cortex	L	-24	-3	51
inferior frontal cortex	R	42	33	3
inferior parietal cortex	L	33	-36	42

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Incompatible Motion *head only*



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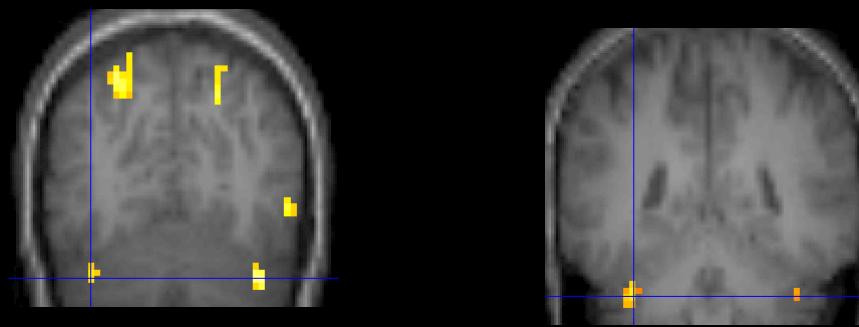
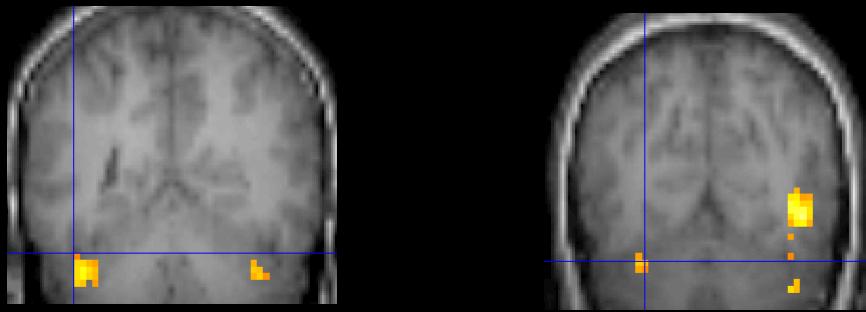


Discussion

- **MTG responds to compatible & incompatible motion**
 - cf. Articulated vs inarticulated human motion
(Beauchamp *et al.*, 2002)
- **Extended network responds to incompatible motion**
 - Anterior STG : semantic attributes (Lu *et al*, 2002)
 - TPJ, premotor
 - Additional response to incompatible head motion - IFG, FFG, STS

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